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PATENT
81326LPK
89158.059902

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appeal No.:	2003-1989)	
)	
Applicant:	Jiann H. Chen et al.)	Examiner:
)	E. Tsoy
Serial No.:	09/608,818)	
)	
Filed:	June 30, 2000)	Art Unit:
)	1762
For:	METHOD OF CURING A FUSER MEMBER)	
	OVERCOAT AT LOW TEMPERATURES)	

REQUEST FOR REHEARING UNDER 37 CFR §§1.196 and 1.197

Board of Patent Appeals and Interferences
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In response to the Decision on Appeal ("Decision") mailed February 26, 2004, the appellants respectfully request that their application be reheard under the provisions of 37 CFR §§1.196(b)(2) and 1.197(b).

In connection with the requested rehearing and in view of the new grounds presented in the Decision, the appellants respectfully request the Board's consideration of the enclosed Declaration by Jiann H. Chen ("Chen Declaration"). Dr. Chen is the first-named inventor of the above-identified application as well as on many patents related to electrostatographic imaging apparatus and materials.

Argument

Claims 1-20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hartley et al., U.S. Patent No. 4,853,737 ("Hartley") and, incorporated by reference, Lentz, U.S. Patent No. 4,257,699 ("Lentz") in view of Schlueter, Jr. et al., U.S. Patent No. 5,995,796 ("Schlueter"). Claims 1-22 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hartley in view of Schlueter and Blong et al., U.S. Patent No. 5,527,858. ("Blong"). Dr. Chen is familiar with the disclosures of all of these references. (Chen Declaration, ¶3)

The Board has sustained the Examiner's §103(a) rejections of the claims, stating on page 9 of the Decision that "we concur with the examiner's determination that Hartly (sic) alone would have suggested the subject matter defined in claim 1 within the meaning of 35 U.S.C. §103." However the Board also noted that their affirmance included new grounds of rejection that rely on the following two newly cited references:

Kirk-Othmer, "Elastomers, Polyisoprene to Expert Systems," *Encyclopedia of Chemical Technology*, pp. 16-20, 22-25 (4th Ed., Vol. 9, John Wiley & Sons, 1994) ("Kirk"); and

Lewis, *Hawley's Condensed Chemical Dictionary*, pp. 437, 1097 (13th Ed., Van Nostrand Reinhold Publ., 1997) ("Lewis").

Dr. Chen has reviewed these new references. (Chen Declaration, ¶4)

Hartley, the primary reference cited in the rejection of the claims of the instant application, discloses a fuser roll having an outer layer that comprises cured fluoroelastomer having pendant polydiorganosiloxane segments that are covalently bonded to the fluoroelastomer backbone. As suitable fluoroelastomer base polymers, Hartley cites Viton A and Viton B, both of which are described in appellants' Attachment B, entitled "Comparison of Dupont Dow Viton® Fluoroelastomers."

In contrast to fluoroelastomer-containing layer of Hartley, the appellants' fuser member overcoat is formed from a cured composition comprising a fluorocarbon thermoplastic random copolymer such as a THV fluorothermoplastic, a relatively recently developed class of materials described in the appellants' Attachment C, entitled "THV Fluoroplastic," *Modern Fluoropolymers*.

The Board has asserted its disagreement with the appellants' differentiation of cured fluoroelastomers and fluorocarbon thermoplastic random copolymers, stating on page 5 of the Declaration that "It is well known in the art that elastomers, including fluoroelastomers, include both thermosetting and thermoplastic polymers. See Lewis and Kirk in entirety, especially page 25 of Kirk."

Lewis includes definitions of "elastomer," "thermoplastic," and "thermoset," which will be discussed in turn. According to Lewis, the term "elastomer" originally referred to "synthetic thermosetting high polymers having properties similar to those of vulcanized natural rubber, namely the ability to be stretched to at least twice their original length and to retract very rapidly to approximately their original length when released. These can be cross-linked..." (emphasis added) Further with regard to

"elastomer," Lewis states that "The term was later extended to include uncross-linked polyolefins that are thermoplastic, ...generally known as TPO rubbers" whose extension and retraction properties are notably different from those of thermosetting elastomers..." (emphasis added) (Chen Declaration, ¶5)

Thus, Lewis teaches that an "elastomer" is a rubbery material whose stretchability and retraction characteristics are very pronounced when they are thermoset by curing or cross-linking (as in the cured Viton elastomers employed in Hartley, Lentz, Schlueter, and Eddy et al., U.S. Patent No. 5,017,432). Lewis further teaches that these characteristics are different in the case of uncross-linked thermoplastic "TPO rubbers," which nonetheless have sufficient resiliency to find use in automobile bumpers and vibration dampers.

As taught in Lewis, the term "thermoplastic" refers to a "high polymer that softens when exposed to heat and returns to its original condition when returned to room temperature." (emphasis added) As examples of thermoplastic polymers, Lewis mentions both natural substances such as crude rubber and synthetic materials such as fluorocarbon polymers. (Chen Declaration, ¶6) Because of its tendency to melt on heating, a thermoplastic polymer such as a THV fluorothermoplastic is melt-processable, as disclosed in Attachment C.

The term "thermoset " according to Lewis refers to a polymer that "solidifies or 'sets' irreversibly when heated," a property "usually associated with a cross-linking reaction of the molecular constituents induced by heat or radiation..." (emphasis added) Lewis further teaches that the cross-linking reaction can be promoted by the addition of curing agents such as organic peroxides or (in the case of rubber) sulfur. (Chen Declaration, ¶7) Thermoset materials thus include cross-linked synthetic polymers or additive-induced cross-linked natural materials such as vulcanized rubber.

Based on the definitions provided by Lewis, it is clear that "thermoset" applies both to cross-linked fluoroelastomers such as cured Viton A or Viton B and to cross-linked thermoplastic fluoropolymers such as cured THV fluorothermoplastics. Furthermore the Lewis definitions of "elastomer" and "thermoplastic" also strongly suggest that a fluoroelastomer such as Viton B and a THV fluorothermoplastic would exhibit substantially differing physical characteristics, despite their both being formed from the same three monomers. (Chen Declaration, ¶8)

The appellants agree with the statement of the Board on pages 5 and 6 of the Decision that elastomers include thermosetting polymers, i.e., cured elastomers. However they respectfully disagree with the Board's accompanying assertion that fluoroelastomers also encompass thermoplastic polymers. This matter will be further addressed in the discussion of Kirk to follow.

Effenberger et al., U.S. Patent No. 5,194,335 ("Effenberger"), cited in the July 17, 2002 Office Action, teaches a fluoroplastic resin dispersion modified by the addition of a fluoroelastomer latex (Abstract, emphasis added), thereby providing further evidence that fluoroelastomers and fluoroplastics are understood by those skilled in the art to be distinctly different classes of materials. Columns 3 and 4 of this patent contain separate lists of suitable fluoroplastics and fluoroelastomers to be combined in the disclosed coating compositions; Viton is included in the list of preferred fluoroelastomers.

The disclosure of Shifman et al., U.S. Patent No. 6,203,873 is similar to that of Eddy et al. in teaching a blend of a first fluorinterpolymer having elastomeric characteristics and a second fluorinterpolymer having thermoplastic characteristics. This patent further discloses that the first fluorinterpolymer having elastomeric characteristics and the second fluorinterpolymer having thermoplastic characteristics each comprises a copolymer, terpolymer, or mixture thereof formed by the copolymerization of two or more monomers selected from the group consisting of HFP, VF, and TFE. Thus, the same three monomers that constitute the fluorocarbon thermoplastic random copolymer included in the coating composition of the present invention are also included in both the elastomeric and the thermoplastic fluorinterpolymers taught by Shifman.

Kirk, the second of the references newly cited by the Board, relates to synthetic thermoplastic elastomers, which, as discussed on page 16, are typically multiphase systems containing thermodynamically incompatible mixtures of a hard polymer that becomes fluid on heating and a softer material that is rubberlike at room temperature. (Chen Declaration, ¶9) These two types of materials tend to separate into two phases, even when they are chemically combined into the same molecule by block or graft copolymerization. Figs. 1 and 2 on pages 17-18 schematically illustrate the arrangement of the separate phases in two types of block copolymers. (Chen Declaration, ¶10)

As stated on page 18, the thermoplastic elastomer need not be a block copolymer but can be instead a mechanically blended mixture of a hard thermoplastic and a softer, more rubberlike polymer that form separate phases, as shown in Figs. 3 and 4 on page 19. (Chen Declaration, ¶11) The elastomer phase may or may not be cross-linked. Table 3 on page 20 contains several hard polymer/elastomer combinations, including a halogenated polyolefin hard polymer and a polyethylene elastomer.

On page 24 of the reference is described the preparation of a thermoplastic polyurethane elastomer in which a rubbery isocyanate-terminated prepolymer reacts with a polyol and additional diisocyanate, the latter two reactants forming separate hard crystalline segments attached to the rubbery prepolymer segments. Page 25 lists the major classes of commercial thermoplastic rubbers in the following order of consumption: styrenic block copolymers, hard polymer/elastomer combinations, thermoplastic polyurethanes, and thermoplastic polyesters.

Blong is directed to a melt-processable coating composition that comprises a blend of a major amount of a melt-processable thermoplastic fluoropolymer component and 0.01-20 wt.% of a poly(oxyalkylene) component. In the illustrative examples of Blong, 3M THV 500 Fluoroplastic is employed as the major thermoplastic fluoropolymer component, with Carbowax™ or Polyox™ polyethylene glycols being used as the poly(oxyalkylene) component. The disclosed blends are melt-processed by extrusion at temperatures of 180-280°C. Thus, the composition of Blong is an example of a hard polymer/elastomer combination, as discussed in Kirk. (Chen Declaration, ¶12)

The thermoplastic elastomeric systems discussed in Kirk and exemplified in Blong are multiphase materials typically consisting of separate hard and soft components. By contrast, the appellants' fuser member includes a layer formed by curing of a coating composition containing a fluorocarbon thermoplastic random copolymer. It should be emphasized that this fluoropolymer is not only thermoplastic but also random, i.e., the reactant monomers are distributed substantially uniformly through a polymer formed in a single-step reaction. (Chen Declaration, ¶13) Such thermoplastic materials differ significantly from the various types of multiphase thermoplastic elastomers described in Kirk: the block or graft polymers that are formed in two or more reaction steps, and the blends, exemplified in Blong, that are produced by mixing two separately formed polymers.

The appellants respectfully call to the attention the following recent patents, all having issued from applications filed June 30, 2000 and all having Dr. Chen as the first-named inventor: (Chen Declaration, ¶14)

U.S. Patent No. 6,355,352, issued March 12, 2002 for FUSER MEMBER WITH LOW-TEMPERATURE-CURE OVERCOAT

U.S. Patent No. 6,361,829, issued March 26, 2002 for METHOD OF COATING FUSER MEMBER WITH THERMOPLASTIC CONTAINING ZINC OXIDE AND AMINOSILOXANE

U.S. Patent No. 6,372,833, issued April 16, 2002 for FLUOROCARBON THERMOPLASTIC RANDOM COPOLYMER COMPOSITION CURABLE AT LOW TEMPERATURES

U.S. Patent No. 6,416,819, issued July 9, 2002 for METHOD OF PREPARING LOW-TEMPERATURE-CURE-COMPOSITION

U.S. Patent No. 6,419,615, issued July 16, 2002 for ELECTROSTATIC CHARGE-SUPPRESSING FLUOROPLASTIC FUSER ROLLER

U.S. Patent No. 6,429,249, issued August 6, 2002 for FLUOROCARBON THERMOPLASTIC RANDOM COPOLYMER COMPOSITION

U.S. Patent No. 6,444,741, issued September 3, 2002 for METHOD OF PREPARING THERMOPLASTIC RANDOM COPOLYMER COMPOSITION CONTAINING ZINC OXIDE AND AMINOSILOXANE

U.S. Patent No. 6,696,158, issued February 24, 2004 for FUSER MEMBER WITH FLUOROCARBON THERMOPLASTICS COATING

Each of the eight patents listed above discloses and claims a coating composition that comprises a fluorocarbon thermoplastic random copolymer containing the same ranges of the same monomers as that recited in claim 1 of the above-referenced application Serial No. 09/608,818, i.e., subunits of $-(CH_2 CF_2)_x-$, $-(CF_2 CF(CF_3))_y-$, and $-(CF_2 CF_2)_z-$, wherein x is from 1 to 50 or 60 to 80 mole percent, y is from 10 to 90 mole percent, z is from 10 to 90 mole percent, and $x + y + z$ equals 100 mole percent. (Chen Declaration, ¶15) Furthermore Hartley, which discloses a fuser roll having an outer layer that comprises cured fluorooelastomer having covalently bonded pendant polydiorganosiloxane segments, is a cited reference in every one of these eight patents, with the exception of U.S. Patent No. 6,419,615. (Chen Declaration, ¶16)

Hartley discloses curing a coated fluoroelastomer-containing layer at temperatures of at least 230°C; similarly, Lentz includes an example with a curing temperature of 232°C.

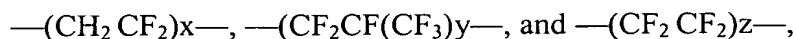
- Neither Hartley nor Lentz nor any of the other cited references teach the use of a metal oxide or combination of oxides to enable low temperature curing of a fluoropolymer layer. By contrast, the appellants' method of making a fuser advantageously provides for the low-temperature curing, at a temperature of 25°C to 120°C, preferably 25°C to 50°C, more preferably 25°C, of a layer formed from a fluorocarbon thermoplastic random copolymer composition containing antimony-doped tin oxide particles.

On pages 8-9 of the Decision, it was stated that the curing treatment of Hartley includes the claimed curing conditions because the transitional term "comprising" in claim 1 does not preclude additional heat treatment at a higher temperature. The appellants believe that the foregoing discussion clearly demonstrates the unobviousness of their invention relative to the disclosures of Hartley and the other cited art. In the interests of expediting the allowance of their claims, however, they would be amenable to the amendment of claim 1 to define more specifically the curing temperature conditions, as follows:

1. A method of making a fuser member having a support comprising the steps of:

A) providing a support;

B) coating a coating composition contained in an organic solvent onto the support, thereby forming a layer of the coating composition on said support, said coating composition comprising a fluorocarbon thermoplastic random copolymer, a curing agent having a bisphenol residue, a particulate filler containing zinc oxide, antimony-doped tin oxide particles, and an aminosiloxane, the fluorocarbon thermoplastic random copolymer having subunits of:



wherein

x is from 1 to 50 or 60 to 80 mole percent,

y is from 10 to 90 mole percent,

z is from 10 to 90 mole percent,

x + y + z equals 100 mole percent; and

C) curing said layer of the coating composition on said support by heating said fuser member for 5 to 10 hours at a temperature in the range of 25°C to a temperature not exceeding 120°C, thereby forming a cured layer of said coating composition without further heating.

Conclusion

Fluoroelastomers and fluorocarbon thermoplastic random copolymers, even if formed from the same monomers in amounts contained within the same specified ranges, are well recognized in the art as distinct classes of materials having substantially differing characteristics. Consequently, because the combined teachings of the originally and newly cited prior art references fail to render obvious the appellants' invention, withdrawal of the §103(a) final rejections of claims 1-22 is respectfully requested, and allowance of this case is earnestly solicited.

Respectfully submitted,

April 15, 2004
Date

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CERTIFICATE OF MAILING BY FIRST CLASS MAIL (37 CFR 1.8)			Docket No. 81326LPK/89158.059902	
Applicant(s): Jiann H. Chen et al.				
Serial No. 09/608,818	Filing Date June 30, 2000	Examiner E. Tsoy	Group Art Unit 1762	
Invention: METHOD OF CURING A FUSER MEMBER OVERCOAT AT LOW TEMPERATURES				
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Docket No.

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Serial No.

09/608,818

Filing Date

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**TRANSMITTAL LETTER
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Docket No.
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In Re Application Of: **Jiann H. Chen et al.**

Serial No.
09/608,818

Filing Date
June 30, 2000

Examiner
E. Tsoy

Group Art Unit
1762

Title: **METHOD OF CURING A FUSER MEMBER OVERCOAT AT LOW TEMPERATURES**

TO THE DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE:

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Dated: *April 15, 2004*

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